

Plastic Limit for Engineering Soils

Lab Test Reference 405
British Standard Reference
BS 1377 : 1990 : Part 2

Principal Apparatus

Laboratory Oven, Lab Inventory No. xxx or xxx (BS2648)
Electronic Balance Lab Invent No.xxx
Desiccator Lab Invent No.xxx
Moisture Content Containers - bound aluminium tins; Flat glass mixing plate
BS Test Sieve with Green Label

1. Preliminaries

- 1.1 This test is carried out in the Soils Laboratory and an area of bench shall first be cleared in readiness.
- 1.2 The glass plate, palette knives and weighing tins shall be checked that they have been cleaned.
- 1.3 The 3mm metal rod shall be checked to ensure the calibration certificate is valid.
- 1.4 The electronic balance and ovens shall be checked to ensure they are operational and the calibration certificates are valid.
- 1.5 Obtain a test worksheet from the Cabinet and ensure the sample number and test schedule correspond.

2. Standard Test Method

- 2.1 Material shall be prepared for the test by following the method laid down in BS1377, Part 1. Notes are summarised on pages 136-138 in these procedures.
- 2.2 About 20g of the soil paste passing the 425 micron sieve is placed on the glass plate and allowed to partially dry if necessary until it can be shaped into a ball.
- 2.3 The whole ball is transferred and moulded and mixed with the hands until it looks homogeneous and slight cracks start to appear on the surface of the ball of clay.
- 2.4 At this point it is rolled into a ball on the glass plate and split into two approximately equal portions weighing around 10 g.
- 2.5 One half is put aside on the plate and the test proceeds with the other.
- 2.6 This half is now split into four pieces and the following part of the procedure carried out on each of these.

- 2.7 Firstly form a 6mm thread between the first finger and thumb of each hand. The soil is then rolled out on the glass plate with the flat of the hand to form threads of soil approximately cylindrical in shape. A slight pressure is exerted such that with successive rolling backwards and forwards over the plate, the diameter is reduced within 5 to 10 movements. It is important to try and keep the shape as cylindrical as possible.
- 2.8 Continue rolling and examine the surface of the soil for cracks. If these start to appear before the diameter has been reduced to 3mm (by comparing it with the standard metal rod), the soil has passed the plastic limit and the specimen is rejected. If no cracks occur, then the soil thread is rolled into a ball and the rolling procedure started again.
- 2.9 If the soil thread can be rolled thinner than 3mm without cracking, then it is still too wet and the procedure starting at paragraph 2.7 shall be recommenced. Weigh the container to be used and record the number of the container and weights in columns 1 and 2.
- 2.10 This rolling and examination for cracks is continued until the soil thread is 3mm thick and shear cracks appear both longitudinally and transversely. At this point the soil starts to crumble apart but the individual pieces which have fallen away from the thread must not be gathered up and reformed into a new thread. These crumbs along with the main thread are gathered up and placed in a weighing container which is immediately covered.
- 2.11 The other three pieces of soil which were separated off in para. 2.5 are similarly treated and the soil placed in the same weighing container when the plastic limit has been reached. Weigh the container and soil and record in columns 1 and 2.
- 3.0 Calculations
- 3.01 The moisture content of the soil in this container is determined in accordance with the procedures described on page's 128 and 129.
- 3.02 The duplicate 10g sample which was put aside in para. 2.3 is similarly treated so that two completely separate determinations are made.
- 3.03 The average of the moisture contents is taken as the plastic limit and expressed to the nearest whole number but if these determinations differ by more than 0.5% moisture content, the test shall be repeated.
- 3.04 Further details regarding the drying method and percentage passing the 425um sieve shall also be recorded.